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SUGGESTIONS FOR THE RE-EVALUATION OF SOME AUSTRALIAN SCRAPER TYPES

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ABSTRACT

A simple attribute analysis was applied to all stone tools in a surface collection from southeast Queensland. The results were then compared with McCarthy's types (McCarthy, 1967). It is suggested that the more sophisticated scrapers usually described by archaeologists may have less formalized counterparts among the so-called miscellaneous scrapers.

The implements discussed in this paper were collected during a field survey in 1966 at Arubial, Horseshoe and Nangram Lagoons on the Condamine River, and at Eurombah and Hornetbank Lagoons near the Dawson River (fig. 1). As the collecting was relatively unsystematic and restricted to surface finds little archaeological importance attaches to them. However, the analysis of the 285 implements revealed that only 15 could not be wholly counted as scrapers. Most of the 'scrapers' belonged to that ubiquitous group 'miscellaneous scrapers'. In an effort to objectify some characteristics of this group the following experiment was carried out.

The comparison of attribute analysis results with standard type descriptions was adopted in response to a situation in which over 90 per cent of implements in a collection would normally be classed as *ad hoc* scrapers. Although evolved independently of J. P. White's analysis of New Guinea highlands flake tools (White, 1967), the attribute analysis employed here places similar emphasis on utilized edges rather than on implement morphology.

The assumption is that 'scraper' may be used as an omnibus term describing a large-scale functional grouping of tools. It is probable that tools capable of satisfying generalized cutting, graving, planing, scraping or even sawing functions have been classified under the headings miscellaneous or generalized scrapers. At the other end of the scale some highly

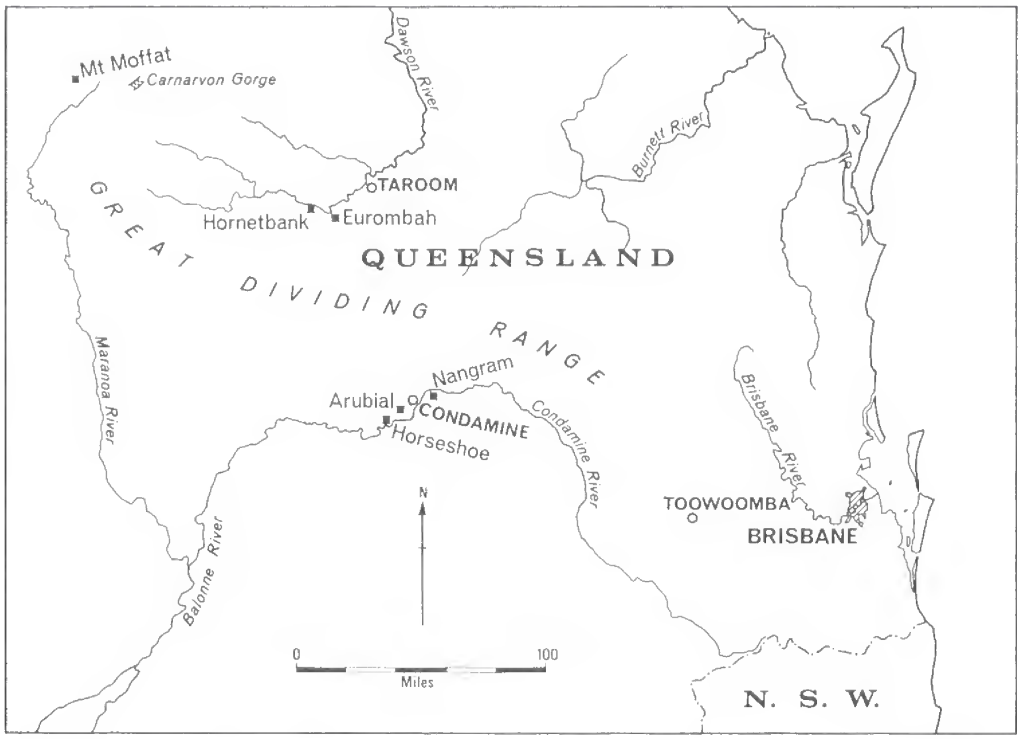

FIG. 1: Map of southeast Queensland.

sophisticated types of scraper have been identified. For Australia, Mitchell (1949, pp. 10–14, 29–34) records the use of any suitable edge of a stone for general cutting operations, but some obviously carefully shaped scrapers are known to exist, for example horsehoof cores, and the various so-called adzes. For this study it is further assumed that by comparing working on unformalized tools with that on more formal ones usage which depends on the existence of a suitably sized and shaped edge may be isolated. Such edges may or may not need to be trimmed to these suitable sizes, shapes, and probably angles. Therefore, if types of scrapers are to be distinguished on this basis, any type may range from completely retouched tools to ones with no retouching at all, provided the characteristics of its use-fractured edges are consistent. By extension, then, the extent to which a tool is retouched, and the form of this retouch are not criteria for distinguishing a functional scraper type, though they may well distinguish varieties within a major group.

It should be noted that an analysis in the terms described below does not distinguish scrapers from types such as chopping tools, pebble tools, *elouera*, points, and other more formalized groupings which are recognized by visual inspection. In other words an attribute analysis will not provide the structure of a typology but if applied to all tools will allow

comparison between retouch and use patterns on formalized and unformalized tools and may therefore permit approximation of the two.

Besides allowing the grouping of relatively unformalized with relatively more formalized tools which seem to belong to the same 'types', the analysis does permit recognition of instances where more than one form of usage is present. In this collection 8 percent of the edges appear to belong to groups other than those into which the artefact they occur on is classed (table 4c).

ANALYSIS

In this paper the term 'utilized' is employed to indicate any edge modified by human intent. Utilized edges, therefore, include use-fractured, retouched, ground and friction polished edges. Retouched edges may often have superimposed use-fracturing. The mor-

TABLE 1

A Code for Describing Stone Tools

1 Morphology:
- 1a Flake retaining striking platform
- 1b Broken flake
- 1c Core
- 1d Pebble
- 1e Lump

2 Shape of utilized edge:
- 2a Straight
- 2b Convex
- 2c Concave
- 2d Nosed
- 2e Pointed

3 Angle of utilized edge:
Accurate measurement of steepest part

4 Form of retouch:
- 4a Scalar retouch—flakes up to 3mm high removed
- 4b Scalar retouch—flakes up to 6mm high removed
- 4c Scalar retouch—flakes greater than 6mm removed
- 4d Step retouch
- 4e Edge ground

5 Percentage of edge retouched:
- 5a less than 10%
- 5b 10–19%
- 5c 20–29%
- 5d 30–39%
- 5e 40–49%
- 5f 50–59%
- 5g 60–69%
- 5h 70–79%
- 5i 80–89%
- 5j 90–99%
- 5k 100%

6 Degree of use-fracture:
- 6aa Very slight, chips less than 1mm removed
- 6a Edge still sharp, chips up to 2mm removed
- 6b Edge blunted, chips up to 4mm removed
- 6c Edge very blunt, chips up to 6mm removed
- 6d Edge rounded by battering, bruising extends up to 1cm from working edge

7 Percentage of edge with use-fracture:
Same groupings as in 5

phological classification is simple and self-explanatory, the term lump being reserved for bits of stone apparently shattered by natural agencies such as fire. Among this collection 41 percent are flakes which retain their striking platforms, 30 percent are broken flakes, 20 percent are lumps, 5 percent are cores, and 4 percent are pebbles. The most common material is quartzite, of which 77 percent of the implements are made. Chalcedonic silica, silicified wood, quartz, basalt, siliceous mudstone, and conglomerate make up the rest.

Table 1 lists the attributes used in this analysis, dividing the material into seven categories. Some of the results of the application of this code are given in tables 2 and 3, and figures 2 to 4. These are briefly discussed below.

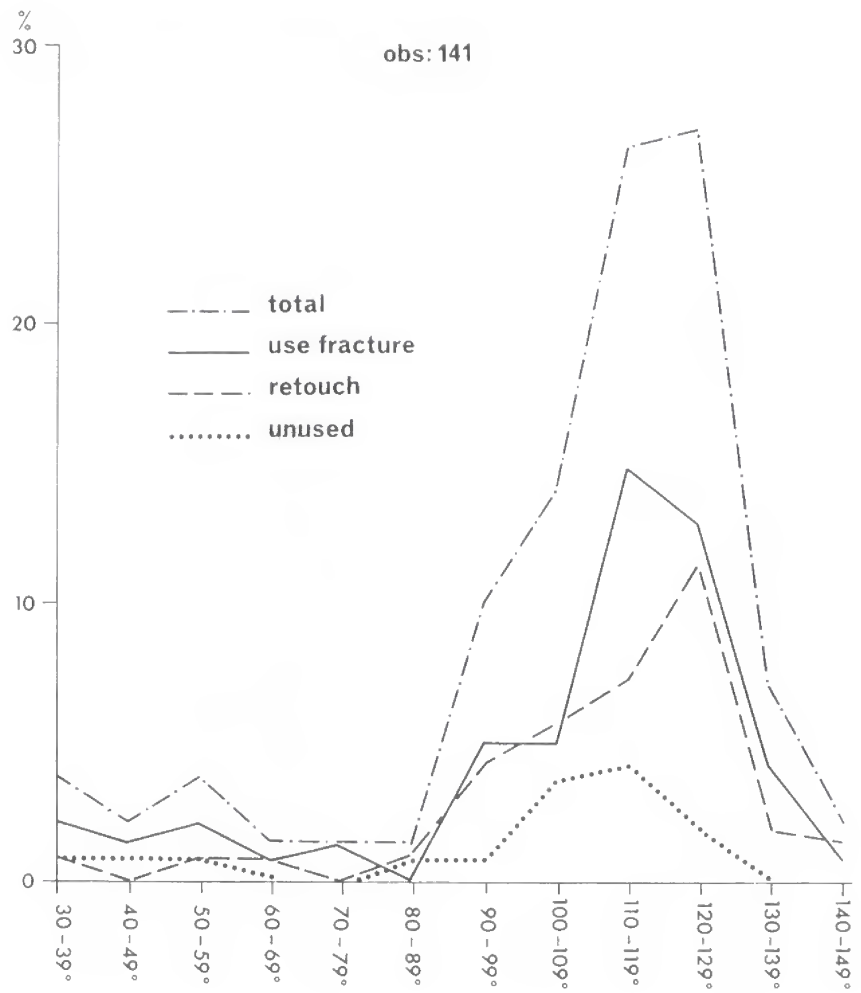

FIG. 2: Striking platform angles.

TABLE 2

OCCURRENCE OF FORMS OF RETOUCH AND USE-FRACTURE AND THEIR COMBINATIONS

Form of retouch or use-fracture	No.	%
Small scalar retouch	60	31
Medium scalar retouch	22	12
Large scalar retouch	68	35
Step retouch	40	22
Very slight use-fracturing	9	2
Slight use-fracturing	266	53
Medium use-fracturing	130	25
Rough use-fracturing	100	20
Use-fracture only	326	63.3
Scalar retouch only	8	1.5
Use-fracture and scalar retouch	142	27.3
Step retouch only	3	0.6
Use-fracture and step retouch	37	7.3

TABLE 3

COMPARISON OF SHAPES AND USAGE ON UTILIZED EDGES

Shape	Use-Fracture		Scalar Retouch		Step Retouch		Total	
	No.	%	No.	%	No.	%	No.	%
Straight	161	49.4	48	32.0	18	45.0	227	44.0
Convex	88	27.0	33	22.0	9	22.5	130	25.0
Concave	59	18.1	52	34.6	9	22.5	120	23.2
Concave/convex	13	4.0	13	8.7	3	7.5	29	5.6
Nosed			2	1.3			2	0.4
Pointed	1	0.3	1	0.7	1	2.5	3	0.6
Straight/convex	1	0.3					1	0.2
Straight/concave	3	0.9					3	0.6
Straight/nosed			1	0.7			1	0.2
Total	326	100	150	100	40	100	516	100

All flakes retaining their striking platforms were examined for evidence of post-detachment trimming of the platform and two were rejected as unmeasurable because of this. Otherwise all striking platform angles were measured using a template former. The range recorded (fig. 2) extends on both sides of that reported for Kenniff Cave (Mulvaney and Joyce, 1965, p. 180), and the inclusion of the unused flakes in the collection made no difference to the range recorded. Although retouched flakes tend to have higher striking platform angles the angle of the striking platform appears to have very little effect on the usability of the flake. Some low angle flakes may have been struck from the side of a core. Prepared or facetted striking platforms are so rare that, as at Kenniff Cave, they may, 'be considered as fortuitous' (Mulvaney and Joyce, 1965, p. 175).

The forms of retouch and the degrees of use-fracture have been arbitrarily divided in an attempt to make more nearly objective recognition of the obvious differences. Deliberate retouch was recorded when more than one chip of about the same size had been taken from one edge. When in serious doubt it was preferred to place an edge in the heavily used, rather than in a retouch category. Utilized edges may occupy from 3 to 100 percent of the margins of a tool and each tool may have more than one utilized edge, distinguished by an unused area or an abrupt angular bend. Altogether 516 utilized edges were recorded on 285 implements. Tables 2 and 3 list the sorts of usage and the shapes of edges, while the graphs in figure 3 show the edge angles of the four commonest edge shapes and the pattern for the whole collection.

Slightly more than one third of the edges are retouched, and of these 22 percent have step retouching, which in this collection occurs only on a form of scraper as a presumed working edge. No evidence of preparation of the core to permit standardized flakes to be removed was found, although the group distinguished as peaked scrapers may have been formed in this way. Table 3 and figure 3 indicate a high proportion of concave retouched edges with high edge angles, an observation also made by McCarthy (1967, p. 29). However, a high proportion of step retouched edges are straight. This contrasts with observations that such edges on the Kenniff Cave material had semi-discoidal and frequently concave-nosed working edges (Mulvaney and Joyce, 1965, p. 176).

Edge angles for retouched and use-fractured edges have almost the same range but, as would be expected, more of the thin edges are merely use-fractured, and more of the thick edges retouched. Figure 3 demonstrates this clearly.

As an approximate guide to the percentage of the margins of the tool a used edge occupies, the centre of the artefact was placed over a point having radiating arms 36° (10%) apart. On many edges use-fracturing exceeds the length of retouch and the greatest length of utilization was recorded. Figure 4 shows the amount of usage on each implement. In this graph the retouch category includes all implements with one or more edges and any use-fractured edges. Implements with retouching tend to have a greater length of their margins utilized. Flakes which retain their striking platforms are never 100 percent used.

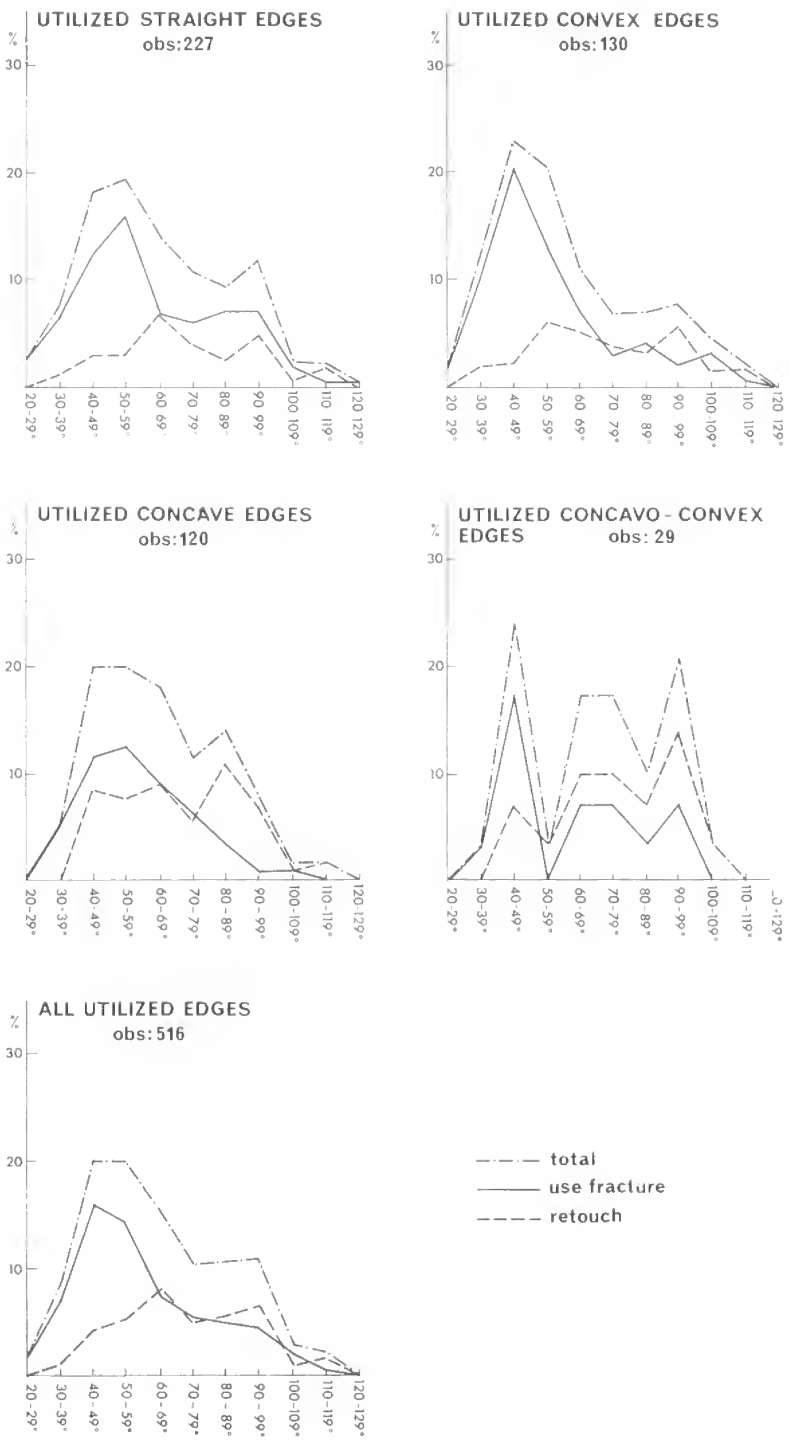

FIG. 3: Edge angles of four commonest edge shapes.

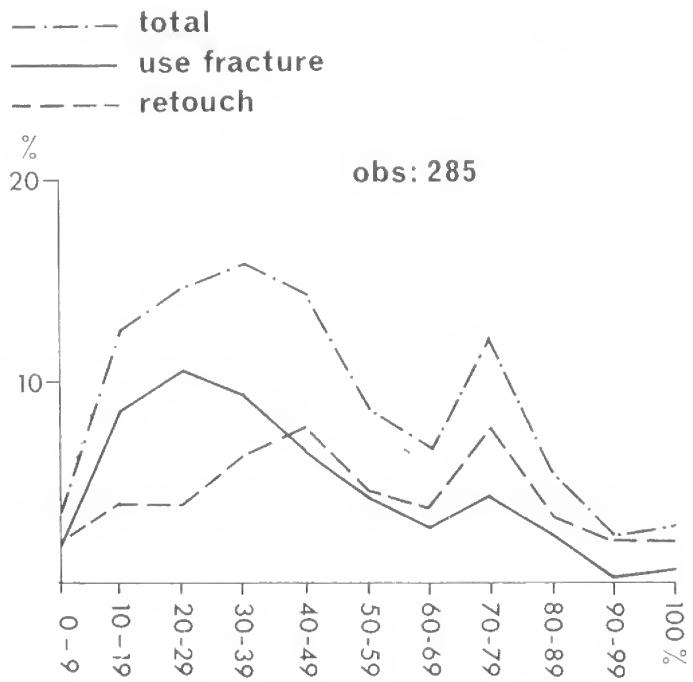

FIG. 4: Percentage of implement margins utilized.

The figures and tables include all edges, not just 'scraper edges'. To facilitate discussion the following points about the non-scraper component may be made. Fifteen implements have edges not classed as scraper edges, that is 6 edges on four pebble tools, 2 on two chopping tools, 2 on one *leilira*, 5 on four *elouera*, 2 on two points, one adze flake edge, and one axe edge. These nineteen edges are 3 . 7 percent of the edges recorded but 68 percent of them are convex, or concavo-convex, over twice the proportion in the rest of the collection. The angles on the edges fall within the general range, but whereas the general range shows a drop between 70° and 90°, these edges fall most often between 70° and 99°. Six of the implements have more than 70 percent of their margins utilized, the others (two pebble tools, both chopping tools, the *elouera*, and the axe) fall within the less used categories.

CLASSIFICATION

The content of tool types which are highly formalized, such as ground axe-heads or the *leilira* knife, is not necessarily altered by the procedure outlined above for it is easy to define boundaries for them. However, where a tool to satisfy a particular need or use may have edges of any form from fortuitously 'correct' to those which must be trimmed to appropriate sizes, shapes and angles, as in the case of many scrapers, then a study such as this is helpful in sorting out the simpler or less extensively trimmed tools which essentially correspond to types isolated by other means.

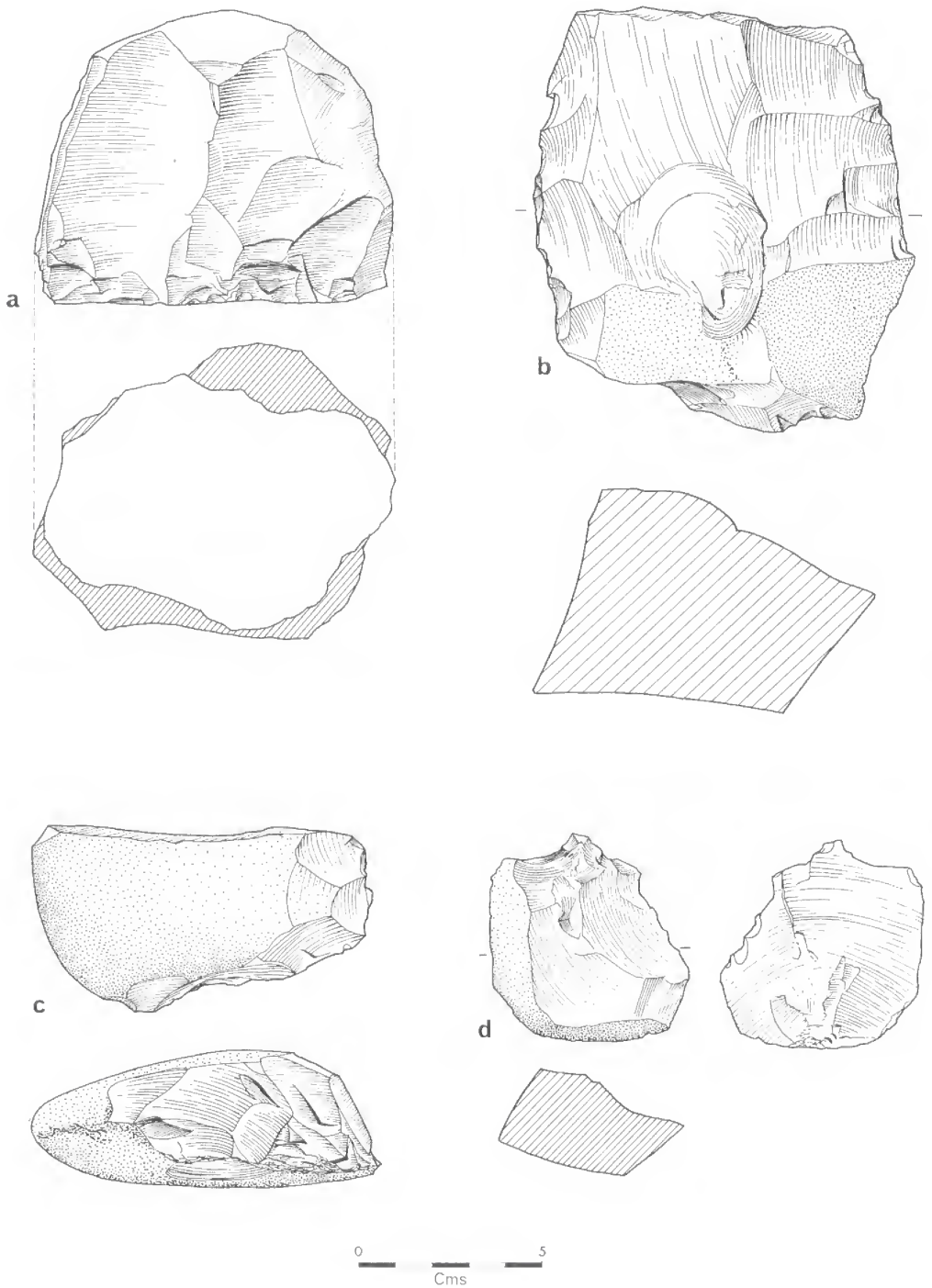

FIG. 5: 'Cliffed' Scrapers: a, Nangram Lagoon; c, Eurombah Lagoon; b, d, Hornetbank Lagoon.

In the generalized sense used in this paper, scrapers account for 93 percent of the implements identified in this collection, and have between them 96.3 percent of the utilized edges. For none of the forms of scraper isolated by this study is any typological validity claimed. However, it should be noted that two of the groups—'cliffed' and 'peaked' scrapers—form isolates which appear to be justifiable empirical groups.

CLIFFED SCRAPERS: *Horsehoof* implements (McCarthy, 1967, p. 18) may be taken as the 'textbook' type (fig. 5a, 6a). They were separated visually from the other tools and to them were added a group of implements similar in many respects but which lacked step-retouch on the edges. The group now corresponded to Mulvaney's *core scrapers* (Mulvaney and Joyce, 1965, p. 176).

Utilized edges on these tools range from 69° to 129° a result obtained by using a template former to make an edge profile, making it possible to measure the actual working edge without obstruction from projecting faces. This is important because a major characteristic of edges on these implements is that acute as well as obtuse angled edges become overhanging above the working edge. This is especially the case with step-retouched edges. It is interesting to note that many obtuse angled edges were not retouched. This overhanging of the edge is coupled with a considerable height—always at least as high as the width of the base and often up to twice this distance. Since all *horsehoofs* and *core scrapers* will balance on this base the face above the working edge might appropriately be described as 'cliffed'.

Working edges on cliffed scrapers have some other characteristics. Use-fracturing is unifacial or mainly unifacial directed from the base or platform up the overhanging face. Scalar and step retouch is always unifacial and is similarly directed, tending to increase the cliffed appearance. Amongst the scrapers step-retouching is confined to cliffed scrapers. Step retouch directed up the face of the tool is clearly different from the facetting on prepared platform cores, and from that on some *tula* adze flakes on which the step retouch runs from the face of the flake across the striking platform.

Thirteen other implements with similar edges and relationship of base to height (fig. 5b, c, d) but of which only one could be described as a core were then added to the original group of *core scrapers* and *horsehoofs*.

The other implements in this group have the appropriate used and overhanging edges. Four of them have such narrow bases that they will not balance (fig. 6b), the other 18 appear to be either accidental removals or tool rejuvenation flakes (fig. 6c, d, e).

These cliffed scrapers and the parts removed from them account for 16 percent of the tools in the collection. Except those corresponding to the *core scrapers* all cliffed scrapers

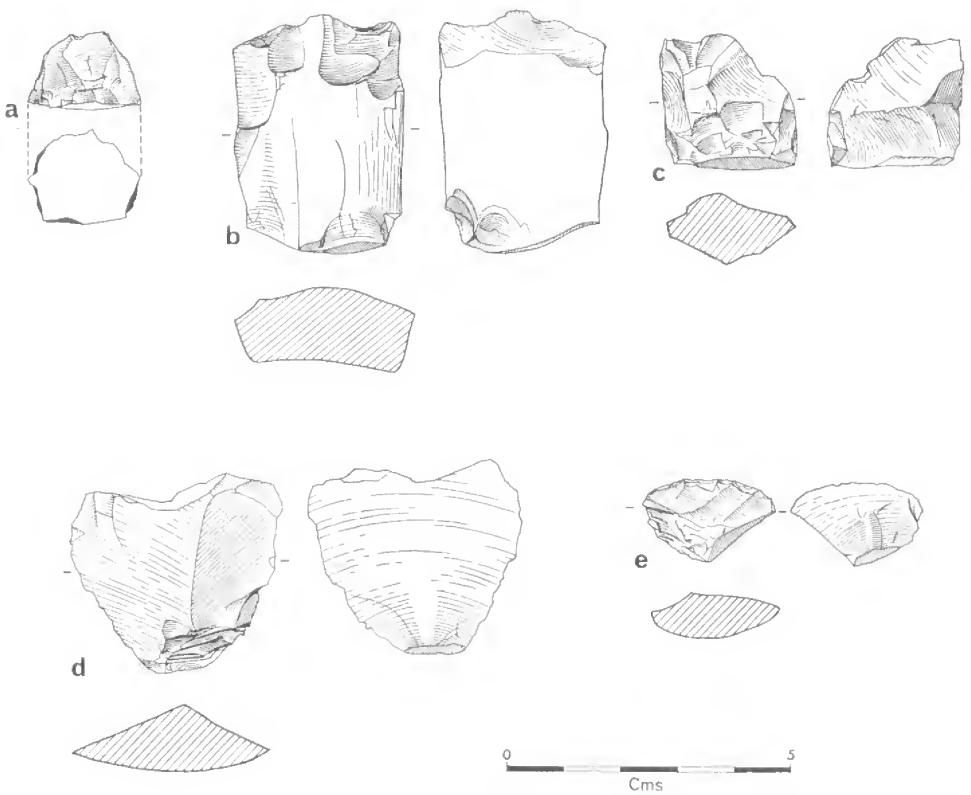

FIG. 6: 'Cliffed' Scrapers: a,c, Horseshoe Lagoon; b,d, Nangram Lagoon; e, Arubial Lagoon.

have other forms of use on them (see table 4), including one which appears to have been turned into an adze (fig. 6e), but in this collection only cliffed scrapers have step retouched edges.

PEAKED SCRAPERS: A second group of scrapers has been called 'peaked' scrapers for want of a better term. It includes 7 percent of the collection. Well made 'peaked' scrapers are almost circular and are characterised by a number of flake scars which meet at a central peak (fig. 7a–d). These flakes appear to have been removed before the implement was detached from its parent nodule. This is also true of less well made items but here the flake scars are less regular and the central peak is often lacking, nor is the circular form so regular (fig. 7e–h). It is noticeable that the less well made group has more retouched edges than the well made group, as if it was necessary to trim the less well made ones more. Two items in each part of the group appear to be unused but have not been checked under a microscope to determine if this is true.

TABLE 4

Typological Correlation

4a: Comparison of Classificatory Groups with Morphological Forms

Morphology	Cliffed Scrapers				Plain Scrapers		Peaked Scrapers		Cores		Pebble Tools									
	Core scrapers	Other balancing scrapers	Tool rejuvenation	Non-balancing	Well made	*ad hoc*	Well made	Poorly made	Simple	Biconical	Unifacial	Bifacial	Chopping tool	Axe head	Adze flake	Leilira	Elouera?	Point?	Unused	Total
Flake		1	11	2	12	89	2	3					1		(1)		1	1	20	143
Broken flake ..		1	5		8	59	3	5					1			1	1	1	17	102
Core	12	1							4	1										18
Pebble		6									2	2		1					1	12
Lump		4	2	2	4	26	6	2									2		21	69
Total	12	13	18	4	24	174	11[a]	10[a]	4	1	2	2[b]	2	1	(1)[cd]	1	4	2	59	344

4B: Comparison of Classificatory Groups with Distribution by Sites

Nangram ..	4	3	7	4	16	71	2	7	3	1					(1)		2	1	33	154
Horseshoe ..	5	5	7		3	31	3	1			1	1		1				1	18	77
Arubial	1	1	3		3	33	4	2	1		1						2		3	54
Eurombah ..		2			1	11	2					1	1						2	50
Hornetbank ..	2	2	1		1	28							1			1			3	39

4C: Comparison of Classificatory Groups with Edge Utilization and Evidence for Re-use of Implements

Primary Use																				
Fractured ..	18	10	3			232	14	9			1						2			289
Retouched ..	1	5			45	68	5	10			1	2	2	1	(1)	2	3	2		147
Step retouch ..	11	7	18	4																40
Secondary—																				
Other ad hoc edges			(17)	(2)	(10)	36							(4)					(3)		
Other well made edges			(1)		1															1
Other pebble chopper edges ..		(2)									1	1								2
Other retouched edges			(1)												1					1
Total	30	22	21	4	46	336	19	19			3	3	2	1	1	2	5	2		516

Notes: a Both these totals include two apparently unused items
b Two other bifacial pebble tools were recorded among the balancing cliffed scrapers
c The adze flake is primarily classed as a cliffed scraper tool rejuvenation flake
d Items in parentheses are not included in column or row totals.

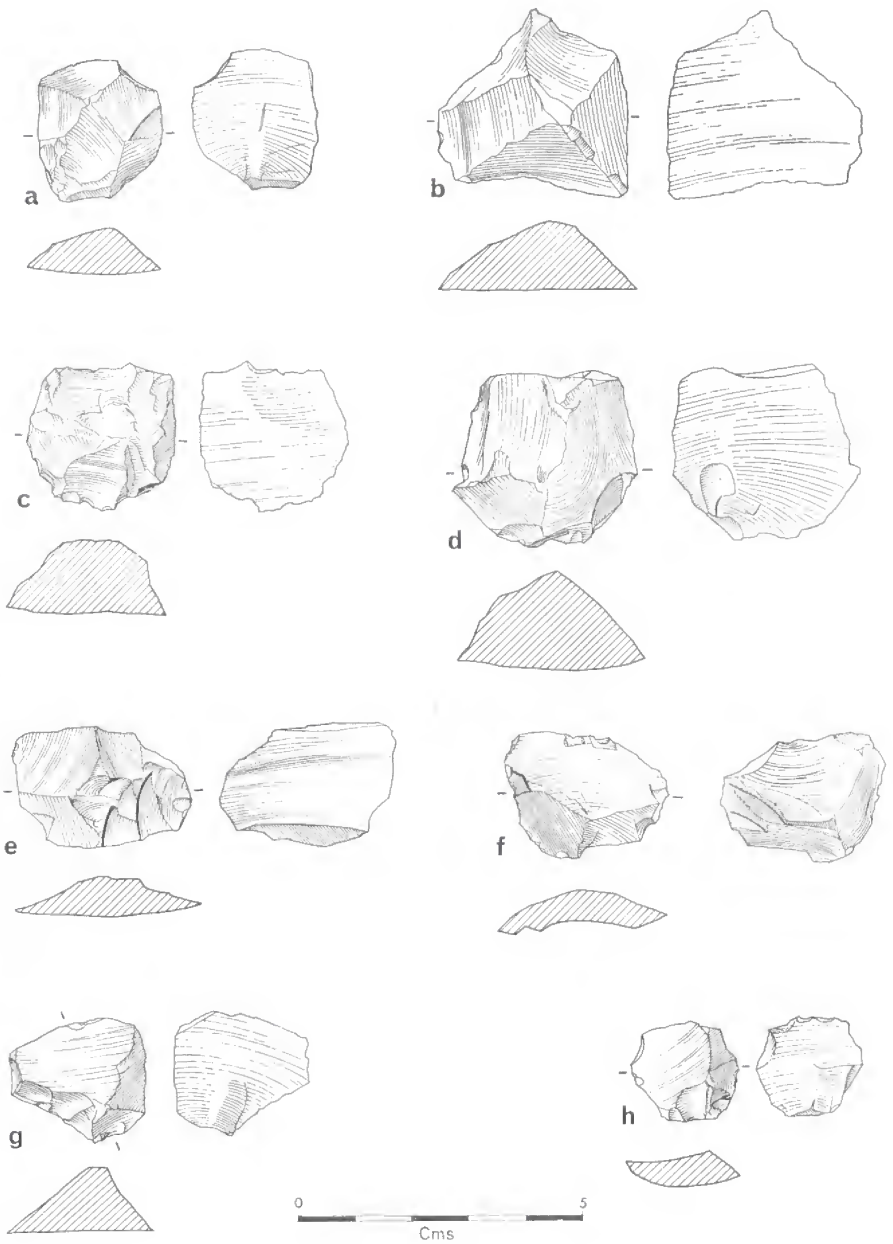

FIG. 7: 'Peaked' Scrapers: a,e,f,g, Nangram Lagoon; h, Arubial Lagoon; c, Horseshoe Lagoon; b,d, Eurombah Lagoon.

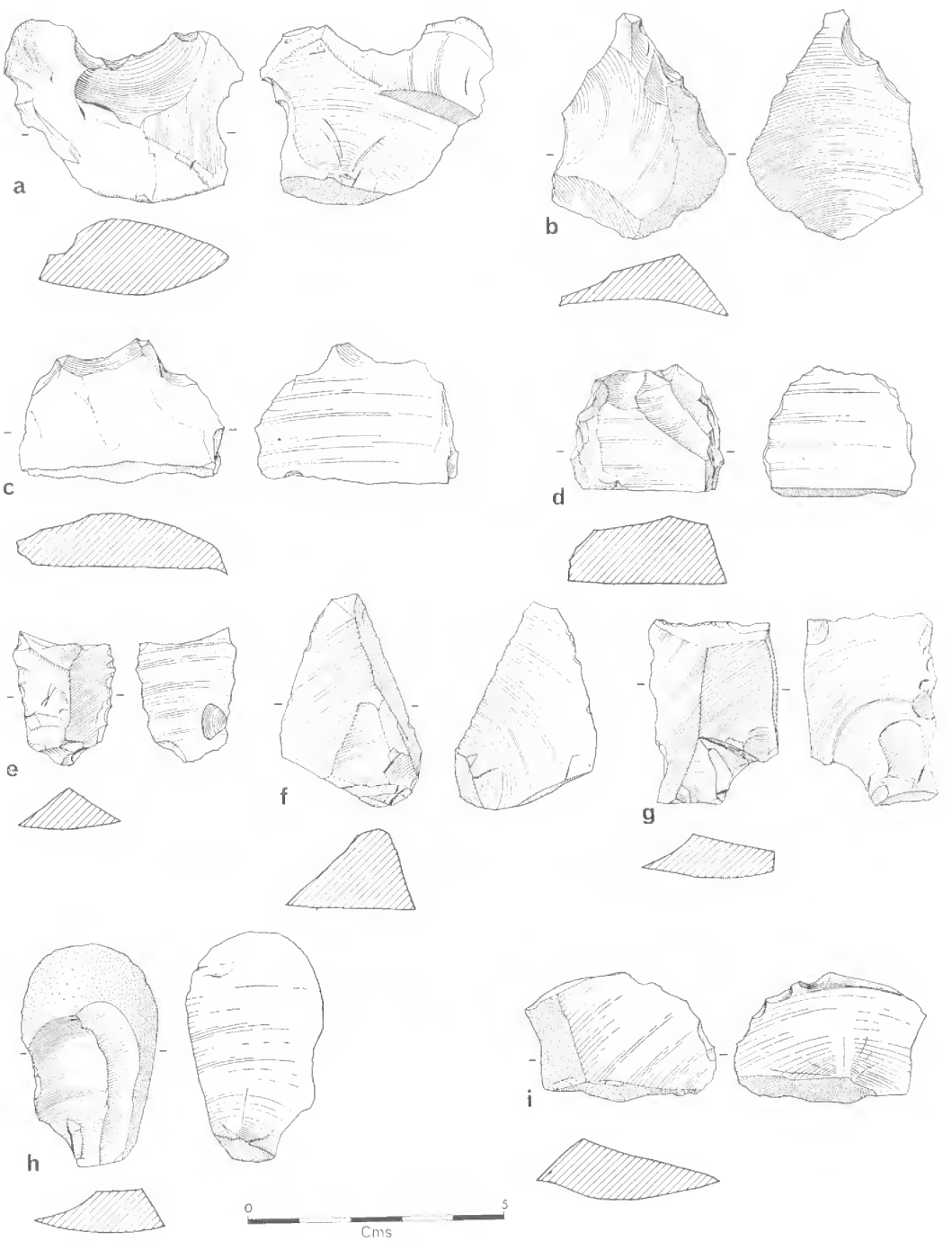

FIG. 8: 'Plain' Scrapers: a,e,f,i, Nangram Lagoon; c, Arubial Lagoon; d, Horseshoe Lagoon; b,g,h,j, Hornetbank Lagoon.

PLAIN SCRAPERS: This category includes the implements not referable to any other group. In face of the miscellany of edge shapes and angles and morphological forms few regularities were distinguishable so that the 'waste basket' category of 'plain' scrapers is the most variable and includes 70 percent of the tools in the collection. Even amongst the neatly retouched group a wide variety of edge shapes and sizes occur. One neatly retouched edge on a 'cliffed' scraper (fig. 6d) is referable to the well made 'plain' scrapers.

Amongst the regularities recorded on the neatly retouched edges were eight neatly made concavities (fig. 8a), two well produced noses, one of which was retouched from alternate sides (fig. 8b, c); and two semi-circular scrapers made on broken flakes (fig. 8d). It was noticed that all the well made (i.e. neat and regular) scraper edges are over 70° and that most have edge angles of over 75°. This division of edges at about 75° seems effectively to distinguish the more formal from the less formal tools. The less formal 'plain' scrapers are probably better described as *ad hoc* cutting or scraping tools. Their used edges are even more variable than those recorded for the better made 'plain' scrapers and the retouching is very irregular and haphazard. Once again regularities of form or edge are rare. Amongst those recorded several times are three triangular pieces, thirteen parallel sided pieces, three pieces the shape of a quarter circle, and five large pieces with lunate concavities (fig. 8e–i).

OTHER IMPLEMENTS: Because of the small number of these tools no typological divisions have been attempted and McCarthy's (1967) groupings have been followed. The identification of *elouera* and points in this collection is based on form and these items might in fact belong in scraper groups, their form being fortuitous. Similarly the adze flake might be considered a form of scraper for adze flakes are hafted as chisels and seem to be used as scrapers. In the analysis these fifteen implements with edges not considered to belong to scrapers show different patterns of distribution in edge shape, angle, and length of margins utilized. However, as these are only 3.7 percent of the total edges no conclusions can be drawn. If further investigation showed these differences to be real it might be suggested that scrapers, sophisticated or 'miscellaneous', do have characteristics by which they can be distinguished from other groups of tools, for example projectile points, knives, chopping tools and axes. On the other hand it could be equally true to say that the characteristic quality of some specialized tool types lies not in their whole shape but in the placement and form of their utilization. It might be expected also that such tools would show consistency in the length of margins affected by working, a factor which does not appear to be crucial for many forms of scraper.

DISCUSSION

SITES

At all sites the main scatter of material was on the highest part of the bank and on the slope facing the lagoon between twenty and fifty yards from the line of coolibahs and water gums marking average water level.

A number of comparisons may be drawn between the five lagoons although the samples are so small and selective that no characterization of industries typical of a particular lagoon should be attempted. The Hornetbank and Eurombah Lagoons on the Dawson River have higher banks than the Condamine lagoons. They appear to be built of outcrops of quartzite pebbles and the implements collected were noticeably heavier and larger than those from the Condamine area. At these three sites a wider variety of stone types was present and the implements were usually smaller, especially at Horseshoe Lagoon. None of the Condamine lagoons had any visible billy outcrops, and at Horseshoe, in particular, much of the site seemed to be subject to periodic flooding. Because the greatest variety of formalized tools came from this lagoon it would seem to hold the best prospect for excavation.

The *leilira* blade was picked up away from the brow of the bank of Hornetbank Lagoon in an area where Aborigines were living until the early years of this century. It is possibly a woman's knife (McCarthy, 1967, p. 32). With this exception all tools were found clustered on the slope of the banks as already described.

All the tools in the collection, except possibly the points, seem to be referable to subsistence activities. These appear to have been mainly the preparation of vegetable foods and the manufacture of bark containers. The collections may thus represent with some accuracy patterns of Aboriginal activities around the lagoons, for container trees were recorded at Horseshoe and Arubial while Nangram is known to have been an important source for waterlilly roots, but it must be emphasized that this conclusion is based on surface collections, and while exploitation patterns may have been stable for centuries, the technology discussed here can in no way approximate an archaeological culture.

Attribute Analysis

It is now apparent that the code on which the edge analysis was based (table 1) is rather too simple.* For instance, no account was taken of whether the edge was complete, truncated by subsequent use, or broken; the relationship of use-fracturing to retouch was ignored; whether or not some edges may have been contemporary was not determined; neither were the sorts of surface which meet to form a utilized edge. Finally, on some artefacts, not all working was around the margins of the same plane, and this made calculation of the percentage of the edges used more difficult.

In the analysis measurements were divided arbitrarily into 10 degree or 10 percent groupings and no attempt was made to see whether the measurements could be divided into more 'naturally' occurring groups. Similarly the problem of measuring the size—length, breadth and thickness—of each artefact was ignored except in the case of flakes with striking platforms. However all items were weighed. (The results of this analysis showed,

*The following criticisms partly result from the use of a more detailed descriptive coding, evolved from this and Dr White's (1967) scheme, to analyse a large collection of New Zealand flake tools. The code employed here was established in 1966.

as expected, that unused items occur on both sides of the weight range for used items.) A more detailed analysis should probably include a section for measurements of different thicknesses for each edge not in the same plane as the surface from which artefact thickness is measured.

Conclusions

The main contribution of this paper is to point out the considerable degree to which less formalized tools may approximate 'text-book' types under some Australian conditions. To achieve this recognition it is necessary to have a typological structure and to apply an attribute analysis to all the tools within the typology not just within certain parts of the typology. Analysis by attributes only is liable to result in a formless picture while inspectional typologies are well known to be selective. This paper has been an attempt to combine both approaches. As a result the original scraper types, isolated according to McCarthy's (1967) scheme, have been considerably altered in content where a large sample was available. It would be interesting to see the approach used on a larger and more varied collection to attempt to determine whether an attribute analysis will distinguish between major groupings of tools, as well as to see whether other tool groups have more and less formalized variants.

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LITERATURE CITED

Crosby, Eleanor, 1967. A new technique for measuring striking platform and scraper angles on stone tools. *J. Polynes. Soc.* **76**: 102–3.

McCarthy, F. D., 1967. 'Australian Aboriginal Stone Implements.' (Australian Museum: Sydney).

Mitchell, S. R., 1949. 'Stone Age Craftsmen'. (Tait Book Co.: Melbourne).

Mulvaney, D. J. and Joyce, E. B., 1965. Archaeological and geomorphological investigations on Mt. Moffatt Station, Queensland, Australia. *Proc. Prehist. Soc.* **31**: 147–212.

White, J. P., 1967. 'Taim Belong Bipo, Investigations towards a prehistory of the Papua–New Guinea Highlands.' Unpublished Ph.D. thesis, Australian National University.